REMARKS/ARGUMENTS

Claims Status

Claims 1-16 are pending. Claims 1, 3, 5 and 11 are currently amended and find support in paragraphs [0038], [0057] and [0062] of the published specification. No new matter has been entered.

§102 and §103 Rejections

The claims have been rejected as follows: (a) claims 1, 2 and 5-9 are rejected as anticipated by JP 2004-57993; (b) claims 3, 4 and 11-15 are rejected as anticipated by *Yagi* (US 2004/0245191); and (c) claims 10 and 16 are rejected as obvious in view of either JP 2004-57993 or *Yagi* in combination with JP 5-76738. Applicants respectfully traverse these rejections.

Independent Claims 1 and 5

JP '993 Describes Pores Having Pd Alloy Film at Narrowest Portion

JP '993 discloses a hydrogen production filter comprising a Pd alloy film on one surface of an electrically conductive substrate having a through-hole (Fig. 1(D) and Fig. 2(D)), and a hydrogen production filter (Fig. 3(D)) comprising a Pd alloy film at the projecting site 33a (corresponding to the narrowest portion) of a through-hole formed through the electrically conductive substrate.

Additionally, JP '993 discloses etching, punching, laser processing or the like (see paragraph [0008]) as the means for forming a through-hole through the electrically conductive substrate. However, etching as the means for forming the through-hole in JP '993 is regarded as being equivalent to punching, and laser processing. Accordingly, JP '993 is not concerned with the projecting site (the narrowest portion) lying in the through-hole.

In contrast, the claimed invention (i.e., claims 1 and 5) recites specific relationships between the parameters T, D1, D2 and D3, including D3/D1<0.8 and D3/D2<0.9. Such parameters define a particular cross-sectional "shape" of the pores. Namely that the narrowest portion of the pore (D3) is between the Pd alloy film end of the pore (D1) and the opposite (non-Pd alloy film end) end of the pore (D2) and that the opening diameter D1 on the Pd alloy film end of the pore, while being larger than D3, is smaller than D2.

Accordingly, the "shape" of the pores is hour-glass like wherein the bottom of the hour-glass (non-Pd alloy film end) is slightly larger than the top of the hour glass (Pd alloy film end). Therefore, the opening diameter D1 of the pore on the surface side of the porous support substrate (on the side joined to the Pd alloy film) is kept very small even though the opening area throughout the filter is large.

JP '993 Does Not Describe Claimed Configuration of Pd Alloy Film

Such claimed structural configuration of the pores allows for the claimed Pd alloy film to be joined to one surface of the porous substrate, and to not be formed in/on the narrowest portion of the pore (having the opening diameter D3) like that of JP '993. Thus, JP '993 does not anticipate the claimed invention for at least these structural differences (i.e., pore "shape" and Pd alloy film location) as explained above.

Furthermore, the hydrogen production filter of JP '993 (e.g., Fig. 3(D)) having a Pd alloy film formed at the projecting site 33a (the narrowest portion) of the through-hole contributes to the penetration of hydrogen being smaller than that of the claimed invention, thereby rendering the hydrogen permeation efficiency of JP '993 lower than that of the claimed invention.

It should also be noted that the claimed relationships between the parameters T, D1, D2 and D3, enables the claimed hydrogen-purification membrane to be used for high pressures (of 0.40 MPa or higher). More specifically, the claimed relationships between the

thickness T of the porous support substrate, the opening diameter D1, the opening diameter D2, the opening diameter D3 and the opening area on the side joined to the Pd alloy film allow for the use of more pores per unit area while the opening diameter D1 of the pore on the surface side of the porous support substrate (on the side joined to the Pd alloy film) is kept very small and, thereby allowing for the opening area to be large throughout the filter, while at the same time allowing for improved mechanical strength of the porous support substrate. A porous support substrate according to the claimed invention allows for a large area of the Pd alloy film, thereby enabling the permeation of hydrogen (the effective hydrogen permeation area) while ensuring that the Pd alloy film is held in place, thereby allowing for high efficiency hydrogen permeation. Thus, the hydrogen-purification membrane according to the claimed invention can be used in high pressure applications (of 0.40 MPa or higher) with ever higher durability and improved hydrogen permeation efficiency (see the specification, page 8, lines 22 to 28). Therefore, since the hydrogen permeation efficiency is related to the pore and Pd alloy film structure and JP '993 does not disclose this structure, JP '993 also does not suggest the benefits of the claimed invention as described above.

Accordingly, Applicants request withdrawal of the anticipation rejections of independent claims 1 and 5 (and all claims dependent therefrom) over JP '993.

Independent Claims 3 and 11

These embodiments of the claimed invention are drawn to *low-pressure* (0.40 MPa or less) hydrogen-purification membranes.

Applicants submit that the hydrogen production filter disclosed in *Yagi* is structurally different from the claimed hydrogen-purification membrane for the following reasons. Referring to Figs. 8, 9E, 10E, 11E and 12C of *Yagi*, the thin-film support substrate 51 and the

Pd alloy thin film 65, 75, 85, 95 are joined together to create a space (indicated by hatches in Figs. 8, 9E, 10E, 11E and 12C), and that space lies continuously throughout an area having none of the columnar projection 53. In other words, the filter of *Yagi* does not satisfy the claimed limitation of "the opening diameter D1 of the pore on the side joined to the Pd alloy film" as recited in the claims.

Accordingly, *Yagi* does not anticipate these claims. As such, Applicants request withdrawal of the anticipation rejections of independent claims 3 and 11 (and all claims dependent therefrom) over *Yagi*.

Dependent Claims 10 and 16

At the outset it should be noted that claims 10 and 16 depend from claims 5 and 11 respectively. Accordingly, the following remarks are in addition to those already presented above with respect to claim 5 (in view of JP '993) and claim 11 (in view of *Yagi*).

JP 5-76738 discloses that the barrier layer for prevention of diffusion of Pd is located between the metal porous support and the Pd thin film. However, JP 5-76738 does not disclose or suggest the claimed relationships between the thickness T of the porous support substrate, the opening diameter D1, the opening diameter D2, the opening diameter D3 and the opening area on the side joined to the Pd alloy film. Accordingly, JP 5-76738 shares the same deficiencies as those described above with respect to both JP '993 and *Yagi*. Thus, the combination of JP 5-76738 with JP '993 or *Yagi* does not suggest the claimed invention. As such, Applicants request withdrawal of the obviousness rejections of dependent claims 10 and 16.

Conclusion

Accordingly, Applicants submit that all now-pending claims are in condition for allowance. Applicants respectfully request the withdrawal of the rejections and passage of this case to issue.

Respectfully submitted,

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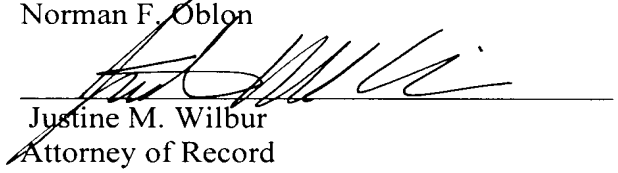

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